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IMAGE FORMING DEVICE

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/1[1]

SPECIFICATION

Title of the Invention

IMAGE FORMING DEVICE /2

[Claims]

[Claim 1] An image forming device having an image processing means with a CPU for receiving character information or image information from a host computer to produce picture image information, an image forming means with a CPU for receiving the picture image information from said means to form an image on a recording medium, a nonvolatile storing means for storage data of execution program, etc. of CPU of said image processing means or said image forming means, and a download execution means for downloading said data in said storing means from said host computer or an external storage medium in accordance with a control command from said host computer or an operating signal from an operating panel,

is characterized by providing with a download execution information display means for displaying such information that the down-load is being executed by said download execution means on the operating panel.

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[1] Numbers in the margin indicate pagination in the foreign text.

[Claim 2] An image forming device which is characterized by providing with a downloading data type display means for displaying the type of data downloading into said storing means by said download execution means on said operating panel
in the image forming device of Claim 1.

[Claim 3] An image forming device which is characterized by providing with a download progress state display means for displaying the download progress state by said downloading execution means on said operating panel
in the image forming device of Claim 1.

[Claim 4] An image forming device which is characterized by providing with a means for judging whether the download is executed by monitoring the necessary voltage of a write/erase power source when a system program of said operating panel is downloaded into said storage means by said download execution means and displaying such information that the download is executed on said operating panel
in the image forming device of Claim 1.

[Detailed Description of the Invention]

[0001]

[Field of Industrial Application] This invention relates to an image forming device of laser printer, intelligent copier,

intelligent fax, etc. which enables the version-up by down-loading data of system programs from an external device such as host computer, etc.

[0002]

[Prior Art] In an image forming device like a laser printer, if character information or image information are received from a host computer such as a PC computer or word processor, an image processing means produces picture image information based on the information and an image forming device receives the picture image information to form an image on a recording medium.

[0003] Generally, the rewrite and version-up by downloading an execution program (system program) of CPU of an image processing device and an image forming device from a host computer or an external storing means is a well-known art in the computer world in which the execution program of CPU is performed based on a random access memory (RAM).

[0004] On the other hand, in image forming devices which is not supplied with a constant power source, such as laser printer, intelligent copier, intelligent fax, etc., a method of replacing the read-on memory (ROM) of an internal control substrate was previously taken to carry out the version-up of a system program of CPU. However, the method of replacing the ROM

of internal control substrate by a serviceman had problems with operation and cost.

[0005] Accordingly, as seen in Japan Kokai 05-274157, a method which facilitates the version-up and can correspond to a variety of needs has been proposed by downloading data of an execution program of CPU from a host computer or external storage medium in accordance with a control command from the host computer or an operating signal from an operating panel.

[0006]

[Problems to Be Solved by the Invention] More recently, however, a system of connecting plural computers to one printer increases and a printer is frequently shared by plural users. Moreover, devices with a function as printer have also increasingly been taken as image forming devices such as intelligent copier, intelligent fax, etc.

[0007] Therefore, in a printer and image forming devices having a function as printer, when necessary data such as an execution program of CPU is downloaded from a host computer or external storage medium, if another user does not notice it and cuts off the power source of this image forming device, there was such a problem that the download is interrupted.

[0008] Moreover, a user who instructs a download cannot confirm whether necessary data are rightfully downloaded in the

download execution, usually, after the end of current download, he performs prescribed operations on an operating panel to display the type of downloaded data and confirms whether the necessary data are rightfully downloaded while seeing the display; if the data are not rightfully downloaded, he must perform the pre-scribed operations on the operating panel or host computer to download necessary data again.

[0009] Furthermore, the user cannot know when the download of necessary data will be ended and this image forming device will be used as printer in the downloading execution, therefore the user can do nothing and just wait until the download is ended, thus too much time is elapsed wastefully.

[0010] This invention was made in view of the above points, and is aimed at preventing the interruption of download /3 of necessary data. It is also aimed at being able to confirm whether the necessary data are rightfully downloaded and easily judge when this download will be ended in the downloading execution.

[0011]

[Means for Solving the Problems] To achieve the above purposes, as shown in a function block diagram of Fig. 1, this invention is provided with a downloading execution information display means C for displaying such information that the down-

load is being executed by a download execution means A on an operating panel B in an image forming device having an image processing means with a CPU for receiving character information or image information from a host computer to produce picture image information, an image forming means with a CPU for receiving the picture image information from said means to form an image on a recording medium, a nonvolatile storing means for storage data of execution program, etc. of CPU of said image processing means or said image forming means, and a download execution means for down-loading said data in said storing means from said host computer or an external storage medium in accordance with a control command from said host computer or an operating signal from said operating panel.

[0012] Moreover, this invention is provided with a down-loading data type display means for displaying the type of data downloading in said storing means by said downloading execution means A on the operating panel B or a download progress state display means for displaying the progress state of downloading by said downloading execution means said on the operating panel B.

[0013] Furthermore, this invention is provided with a means (hard circuit) for judging whether the download is executed by monitoring the necessary voltage of a write/erase power source

when a system program of said operating panel B is downloaded into said storage means by said downloading execution means A and displaying such information that the downloading is executed on said operating panel B.

[0014]

[Functions] According to the image forming device of this invention, other users can recognize at a glance that downloading is currently executed because the downloading execution means displaying means C displays such information that the download is being executed by the download execution means A on the operating panel B. Accordingly, this invention can prevent the download of necessary data from being interrupted because the wrong cut-off of power source of this image forming device is inevitably eliminated.

[0015] Moreover, if the type of data downloading in the storage means is displayed on the operating panel B by the downloading execution means A, the user who instructs the download can see the type can confirm whether the necessary data are rightfully downloaded while seeing the display. That is, he can confirm whether the necessary data are rightfully downloaded without any operations on the operating panel B in the download execution. Other users can also confirm the downloading data and simply grasp the state of the image forming device.

[0016] Or if the progress state of downloading by the download execution means A is displayed on the operating panel B, the user who instructs this downloading can know when this downloading will be ended and this image forming device will be used as printer.

[0017] Furthermore, if whether the downloading is executed is judged by monitoring the necessary voltage of a write/erase power source when a system program of said operating panel B is downloaded into said storage means by said downloading execution means A and such information that the downloading is executed is displayed on said operating panel B, other users can recognize at a glance that the downloading is currently executed even when the display control cannot be made by CPU because of the download of system program of the operating panel B is in execution, therefore the wrong cut-off of the power source of this image forming device is eliminated and the download can be prevented from being interrupted.

[0018]

[Actual Examples] Actual examples of this invention are specifically illustrated based on drawings. Fig. 2 is an oblique view showing an appearance example of a laser printer being one actual example of this invention, and it has an operating panel **1** described later, a paper feed cassette **2** for receiving a paper

to be fed and a paper discharge tray **3** for receiving a discharged printed paper.

[0019] Fig. 3 is a layout diagram showing an appearance example of the operating panel **1**. This operating panel **1** comprises an LCD (liquid crystal) display part **5**, an LED (light-emitting photodiodes) group **6**, and a key switch group **7**, etc. The LCD display part **5** displays various information, e. g., paper size, paper direction, alphabetic faces, Chinese faces, number of copies, etc. This LCD display part **5** becomes such a dot-matrix construction that error messages can also be displayed.

[0020] The LED group **6** can display the power ON/OFF or Ready/Busy, etc. by lighting/lighting out/flashing. The key switch group **7** is for inputting/setting faces, emulation or interfaces, etc.

[0021] Fig. 4 is a block diagram showing a construction example of printer controller of this laser printer. This printer controller **10** receives character information or image information from a host computer **26** such as a PC computer or word processor, etc. to produce a picture image information and is constructed as below.

[0022] Namely, it is constructed by a CPU **11**, a program ROM **12**, a font ROM **13**, a RAM **14**, an NVRAM **15**, an IC card **16**, I/Fs such as an engine interface (⌈interface⌋ is abbreviated as ⌈I/F⌋ hereafter) **17**, a panel I/F **18**, a disc I/F **19**, a host /4 I/F **20**, an option I/F **21**, and a bus **22**.

[0023] The CPU **11** is a central processing unit for controlling the entire printer controller **10** by mode instructions from system programs (execution programs) of program ROM **12** and mode instructions of control commands from the operating panel **1** as well as commands from a host computer **26**, and also fulfils functions as the download execution means A and the download execution information display means C.

[0024] The program ROM **12** is a rewritable nonvolatile storing memory for storing system programs of this printer controller **10**. The font ROM **13** is a rewritable nonvolatile storing memory for storing font data.

[0025] The RAM **14** is a work memory of CPU **11** and is a random access memory used in an input buffer for storing input data, a page buffer for storing page data and a bitmap buffer for storing picture image data (bitmap data), etc. The NVRAM **15** is a nonvolatile memory (NVRAM) for storing contents of mode instructions, etc. from the operating panel **1**.

[0026] The IC card **16** is a detachable memory card (external storage medium) used in case of supplying execution programs such as system program, emulation program, etc. of the printer controller **10** from the outside. The engine I/F **17** is an interface for performing communication of control command and status or picture image data, system program (download data) with an engine **23**.

[0027] The engine I/F **18** is an interface for performing communication of control command and status or picture image data, system program (download data) with the operating panel **1**. The host I/F **19** is an interface for performing communication with a disk unit **24**.

[0028] The host I/F **20** is an interface for performing communication with the host computer **26** and is usually a centro I/F or RS232C. The option I/F **21** is an interface for performing communication with an option **25**. The engine **23** is an image forming device fitted with an engine control part containing CPU inside it in addition to the paper cassette **2** and the paper tray **3** shown in Fig. 2, and it receives the picture image information from the printer controller **10** to form an image on a recording medium (paper).

[0029] The disk unit **24** is an external memory device, a floppy disk unit (FDD) or a hard disk device (HDD), etc. for

storing various data such as system programs of the printer controller **10** or engine **23**, execution programs such as emulation program, etc. and font data, etc. The option **25** is added as necessary, such as expansion memory, etc.

[0030] Fig. 5 is a flow chart showing one example of processing actions relating to this invention in this laser printer. This routine is started when a download instruction (control command) from the host computer **26** or a download instruction from the IC card **16** or the disk unit **24** based on an operating signal from the operating panel **1** exists.

[0031] Then, the CPU **11** downloads the data from the host computer **26** or data prepared in the disk unit **24** or the IC card **16** into the RAM **14** via corresponding interfaces (host I/F **20**, disc I/F **19** and bus **22**), then judges whether the data (version) are new data by the version number, interrupts the download if they are not new data and displays no need of version up and the interruption of download in the LCD display part **5** of the operating panel **1**.

[0032] Here, system programs of the printer controller **10** or engine **23**, execution programs such as emulation program, etc. or font data are given as data for the download. These data have various informations such as information showing version (data) No., writing destination, partial rewrite or whole rewrite, etc.

[0033] If the data downloaded into the RAM **14** are new data, a processing for downloading the data into a nonvolatile storing medium (any of program ROM **12**, font ROM **13** or program ROM, etc. in the engine **23**, etc.) being the writing destination is started, a processing of partial write or whole write of the data on the recording medium are performed, simultaneously, such information that the download is being executed (e. g., ⌈download under execution⌋) is displayed on the LCD display part **5** of the operating panel **1** and the display disappear at the end of the download.

[0034] Thus, in the laser printer of this actual example, other users can recognize at a glance that downloading is currently executed because necessary data are downloaded from the host computer **26**, IC card **16** or the disk unit **24** into a corresponding nonvolatile storage medium in accordance with a control command from the host computer **26** or an operating signal from the operating panel **1** and such information of download under execution is displayed on the LCD display part **5** of the operating panel **1** at that time. Accordingly, the cut-off of power source of this laser printer is inevitably eliminated and the download of the necessary data is not interrupted.

[0035] When the necessary data are downloaded, if their type is displayed in the LCD display part **5** of the operating panel /5

1 as shown in Fig 6, the user who instructs the download can confirm whether the necessary data are rightfully downloaded while seeing the display, thus he needs not perform special operations on the operating panel **1** under the download execution. Other users can also simply grasp the state of image forming device.

[0036] When the necessary data is downloaded, if the progress state of the download as shown in Fig. 7 is displayed in the LCD display part **5** of the operating panel **1** (e. g., ⌈70% download under execution⌋), the user who instructs the download can know when the download will be ended and the printer function will be used. Moreover, the processings of Fig. 6 and Fig. 7 can also be combined, thereby both effects can be obtained simultaneously.

[0037] Here, if information showing the volume of data is given to the data for the download, the progress ratio of download can be simply obtained. For example, if a case of downloading 128 KB of data is considered, 50% progress of download can be obtained at such a time of point that 64 KB of data in it is downloaded.

[0038] Next, a laser printer of another actual example of this invention is illustrated. Moreover, its hard constitution is same as aforesaid actual example except for operating panel,

therefore Fig. 4 is used again. Fig. 8 is a block diagram showing a construction example of the operating panel in the laser printer of another actual example of this invention, and same symbols are attached to same parts as Fig. 3.

[0039] In addition to the LCD display part **5**, LED group **6** and key switch group **7** shown in Fig. 3, a download display part **30** is provided at the outside of this operating panel **1**. A control part comprising a CPU **31**, a program ROM **32**, a write/erase power source **33**, a voltage monitoring circuit **34**, an LCD driver **35**, an LED driver **36** and a controller I/F **37**, etc. is provided inside it.

[0040] The download display part **30** is to display such information that a system program of the operating panel **1** is being downloaded into the program ROM **32** by CPU **11** of Fig. 4 and CPU **31**. For example, LED can be used as this download display part **30**, and the display can be simple and inexpensive in that case.

[0041] The CPU **31** is a central processing unit for controlling the entire operating panel **1** in accordance with system programs in the program ROM **32**. The program ROM **32** is a rewritable nonvolatile memory for storing the system programs of the operating panel **1**. The write/erase power source **33** is a

necessary power source when a system program of the operating panel **1** is downloaded into the program ROM **32**.

[0042] The voltage monitoring circuit **34** judges whether the download is being executed by monitoring the voltage of write/ erase power source **33**, and displays such information that the download is being executed (the voltage of write/erase power source **33** changes with the voltage at the time of write/erase) in the display part **30**.

[0043] The LCD driver **35** drives the LCD display part **5** and the LED driver **36** drives the LED group **6**, respectively. The controller I/F **37** is an interface for performing communication with the printer controller **10**.

[0044] In the laser printer of this actual example, like aforesaid actual example, necessary data are downloaded from the host computer **26**, IC card **16** or the disk unit **24** into a corresponding nonvolatile storage medium in accordance with control commands from the host computer **26** or an operating signal from the operating panel **1** and such information that the download is being executed is displayed in the LCD display part **5** of the operating panel **1** at that time.

[0045] However, the CPU **31** shown in Fig. 8 cannot be used in case the data is a system program of the operating panel **1**, therefore the above information cannot be displayed in the above

LCD display part **5**. The hard circuit in the operating panel **1** performs a processing as below.

[0046] Namely, if a system program is sent from the operating panel **10**, the controller I/F **37** controls the write/erase power source **33**, and this system program is downloaded in the program ROM **32**. At this time, the voltage monitoring circuit **34** judges whether the download is being executed by monitoring the voltage of write/erase power source **33**, and displays such information in the display part **30** when the download is being executed.

[0047] Accordingly, other users can recognize at a glance that the download is currently executed even when the display control cannot be made by the CPU **31** since the download of system program of the operating panel **1** is under execution, therefore the cut-off of power source of this laser printer is inevitably eliminated and the download of the necessary data is not interrupted.

[0048] This invention was illustrated for actual examples of applying this invention to a laser printer, but this invention is not limited thereto and can certainly applied to other printers such as LED printer, liquid crystal shutter printer, etc. and various image forming devices such as intelligent copier intelligent fax, etc.

[0049]

[Effects of the Invention] As illustrated above, according to the image forming device of this invention, the download of necessary data can be prevented from being interrupted and the operability/reliability are raised because other users do/6 not cut off the power source without noticing that the download is under execution.

[0050] Moreover, according to the invention of Claim 2, a user who instructs the download can confirm whether necessary data can be rightfully downloaded under the execution of download. Other users can also confirm the downloading data and can simply grasp the state of image forming device. According to the invention of Claim 3, a user who instructs the download can confirm when the download will be ended and this image forming device will be used as printer.

[0051] According to the invention of Claim 4, other users can recognize at a glance that the download is currently executed even when the display control cannot be made by CPU since the download of system program of the operating panel **1** is under execution, therefore the power source is not wrongly cut off and the interruption of download can be surely eliminated.

[Brief Description of the Drawings]

[Fig. 1] A function block diagram showing the basic constitution of this invention.

[Fig. 2] An oblique view showing an appearance example of a laser printer being one actual example of this invention.

[Fig. 3] A layout diagram showing an appearance example of an operating panel of Fig. 2.

[Fig. 4] A block diagram showing a construction example of printer controller of a laser printer of Fig. 2.

[Fig. 5] A flow chart showing one example of processing actions relating to this invention in the laser printer of Fig. 4.

[Fig. 6] A flow chart showing another example of processing actions relating to this invention likewise.

[Fig. 7] A flow chart showing still another example of processing actions relating to this invention likewise.

[Fig. 8] A block diagram showing a construction example of operating panel of a laser printer in another example of this invention.

[Description of the Symbols]

1 : operating panel

5 : LCD display part

6 : LED group

7 : key switch group

10 : printer controller

11, 31: CPU (central processing units)

12, 32: program ROM

13 : font ROM

14 : RAM

15 : NVRAM

16 : IC card

23 : engine

24 : disk unit

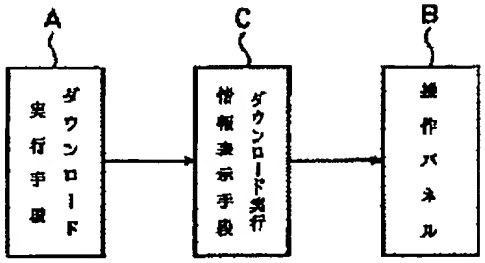
33 : write/erase power source

34 : voltage monitoring circuit

35 : LCD driver

36 : LED driver

37 : controller I/F

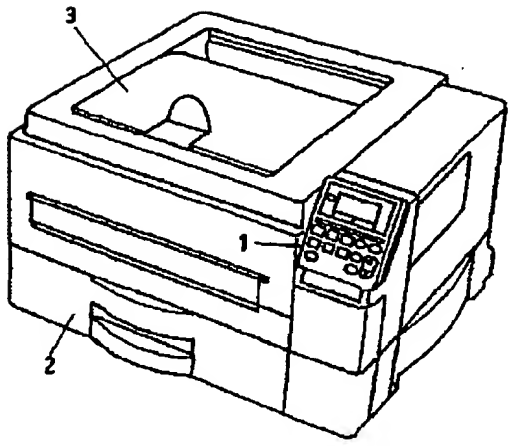


[Fig. 1]

A : download execution means

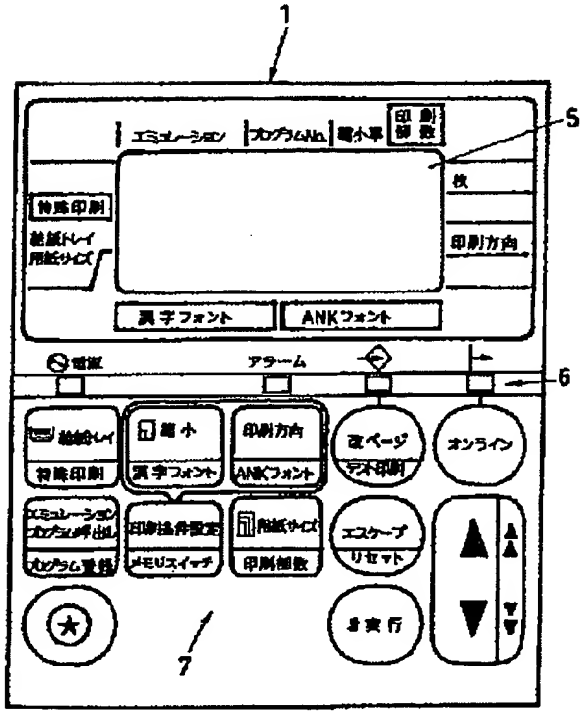
C : download execution information display means

B : operating panel



[Fig. 2]

/7



[Fig. 3]

upper

(line 1) emulation program No. reduction percentage number of print

(line 2) special printing piece

(line 3) paper feed tray printing direction

paper size

(line 4) Chinese font ANK font

(line 5) power source alarm

lower

(line 1) paper feed tray reduction

printing direction page change online

(line 2) special printing Chinese font ANK font

test print

(line 3) emulation printing conditions setup paper size

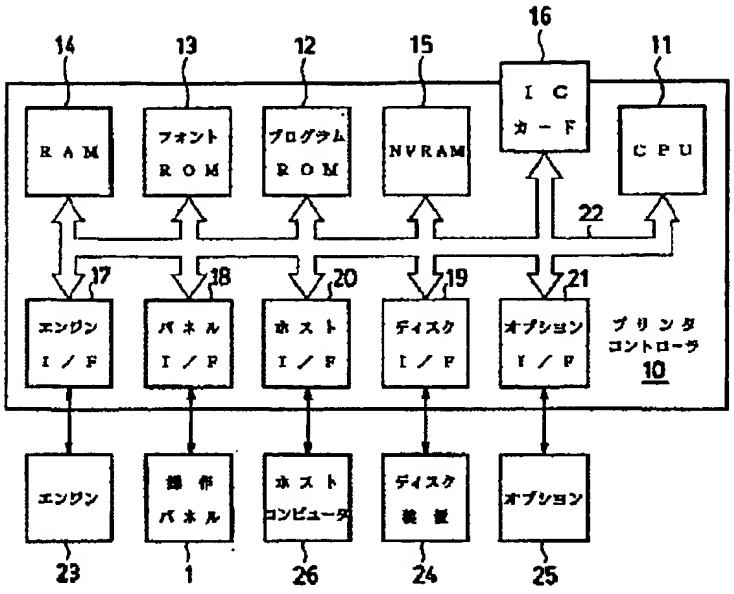
escape

call program

(line 4) program registration

memory switch number of print reset

(line 5) key execution



[Fig. 4]

1 : operating panel

10 : printer controller

11 : CPU

12 : program ROM

13 : font ROM

14 : RAM

15 : NVRAM

16 : IC card

17 : engine I/F

18 : panel I/F

20 : host I/F

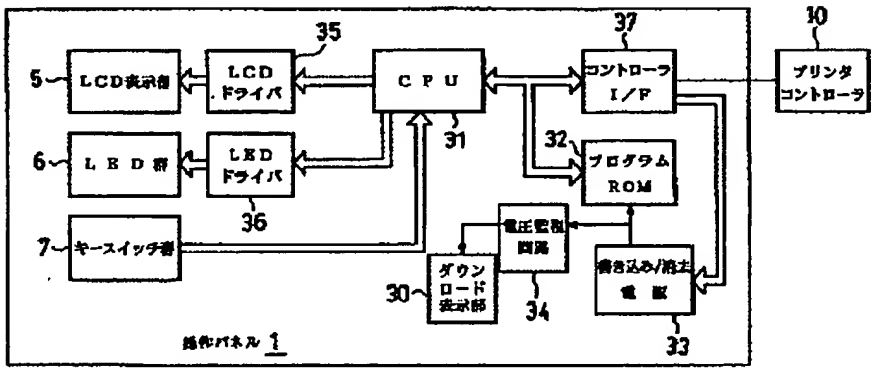
19 : disk I/F

21 : option I/F

24 : disk unit

25 : option

26 : host computer



[Fig. 8]

1 : operating panel

5 : LCD display part

6 : LED group

7 : key switch group

10 : printer controller

30 : download display part

31 : CPU

32 : program ROM

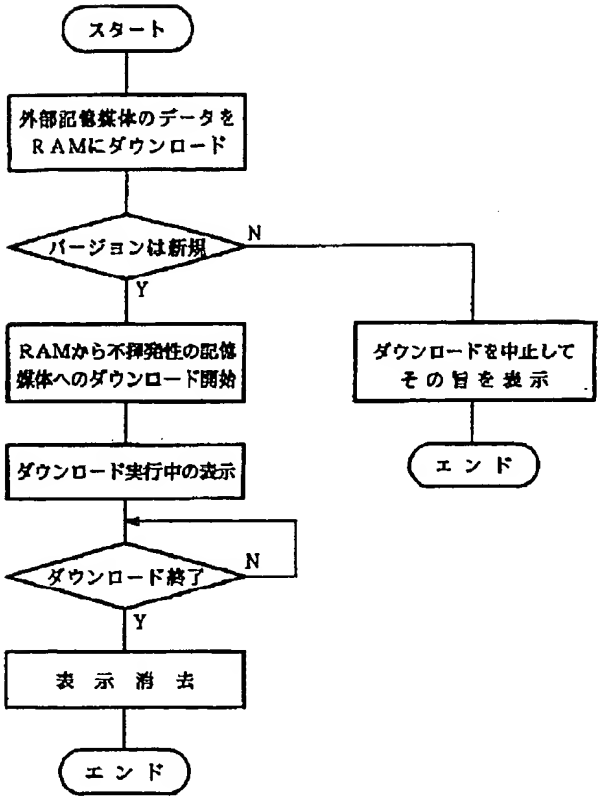
33 : write/erase power source

34 : voltage monitoring circuit

35 : LCD driver

36 : LED driver

37 : controller I/F



[Fig. 5]

START

|

Download data of external storage medium into RAM

|

Is version new?

(No — Display interruption of download

|

END)

(Yes)

|

Start download from RAM into nonvolatile storage medium

|

Display "download under execution"

|

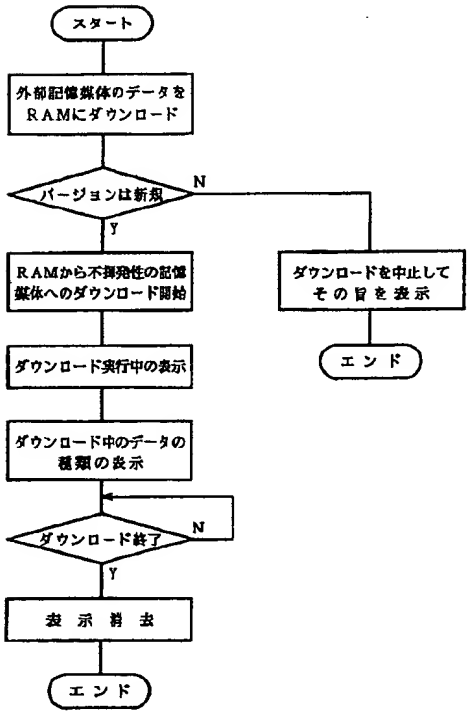
End download

|

Erase display

|

END



[Fig. 6]

START

|

Download data of external storage medium into RAM

|

Is version new?

(No — Display interruption of download

|

END)

(Yes)

|

Start download from RAM into nonvolatile storage medium

|

Display "download under execution"

|

Display type of data in download

|

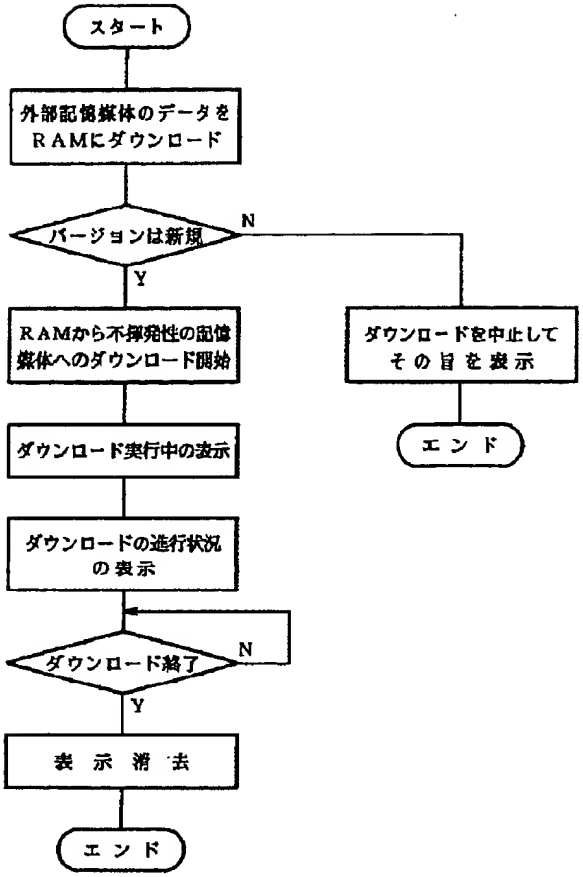
End download

|

Erase display

|

END



[Fig. 7]

START

|

Download data of external storage medium into RAM

|

Is version new?

(No — Display interruption of download

|

END)

(Yes)

|

Start download from RAM into nonvolatile storage medium

|

Display "download under execution"

|

Display progress state of download

|

End download

|

Erase display

|

END